Behavioral Corporate Finance

Ulrike Malmendier

RSF Summer Camp, July 5, 2016

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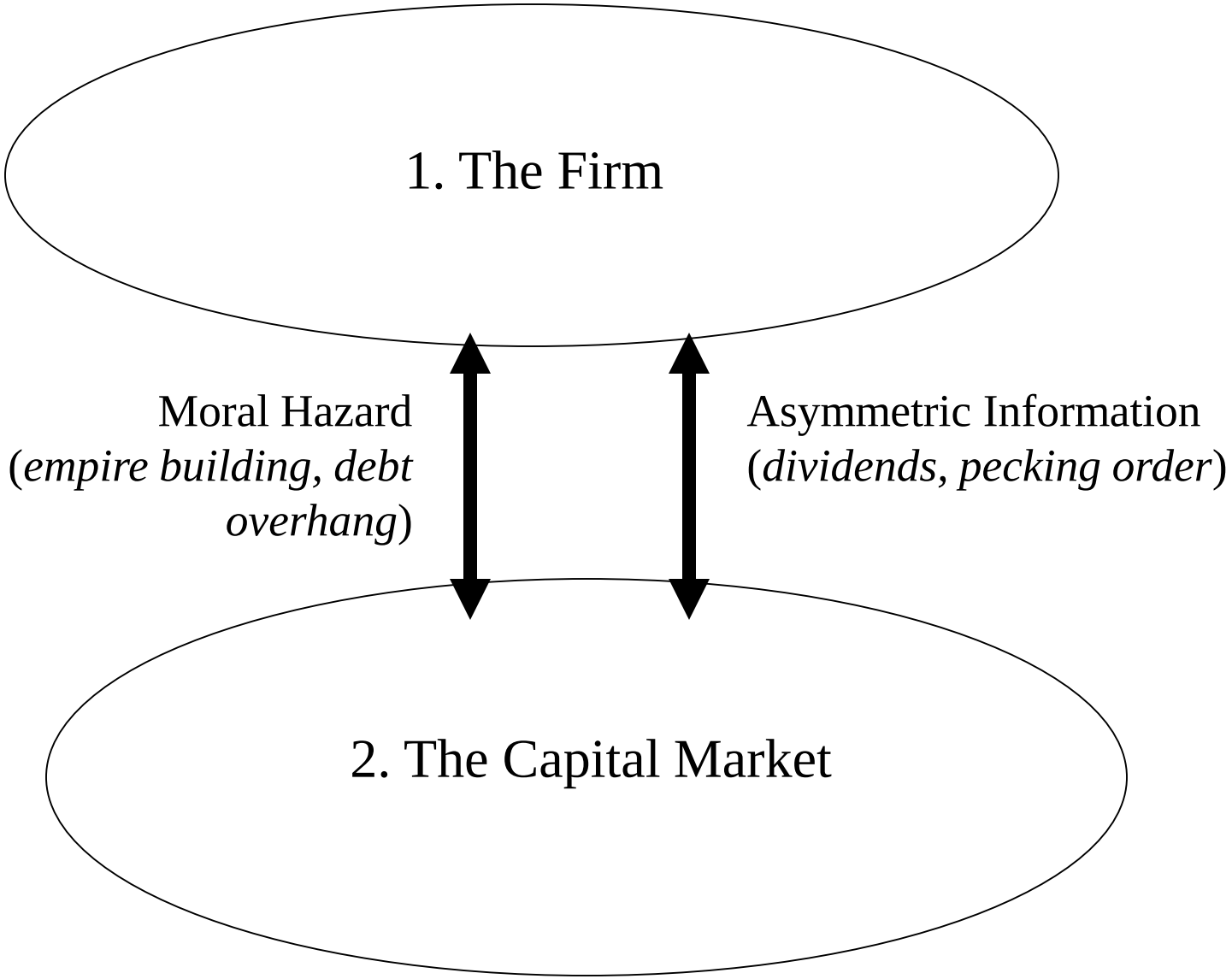
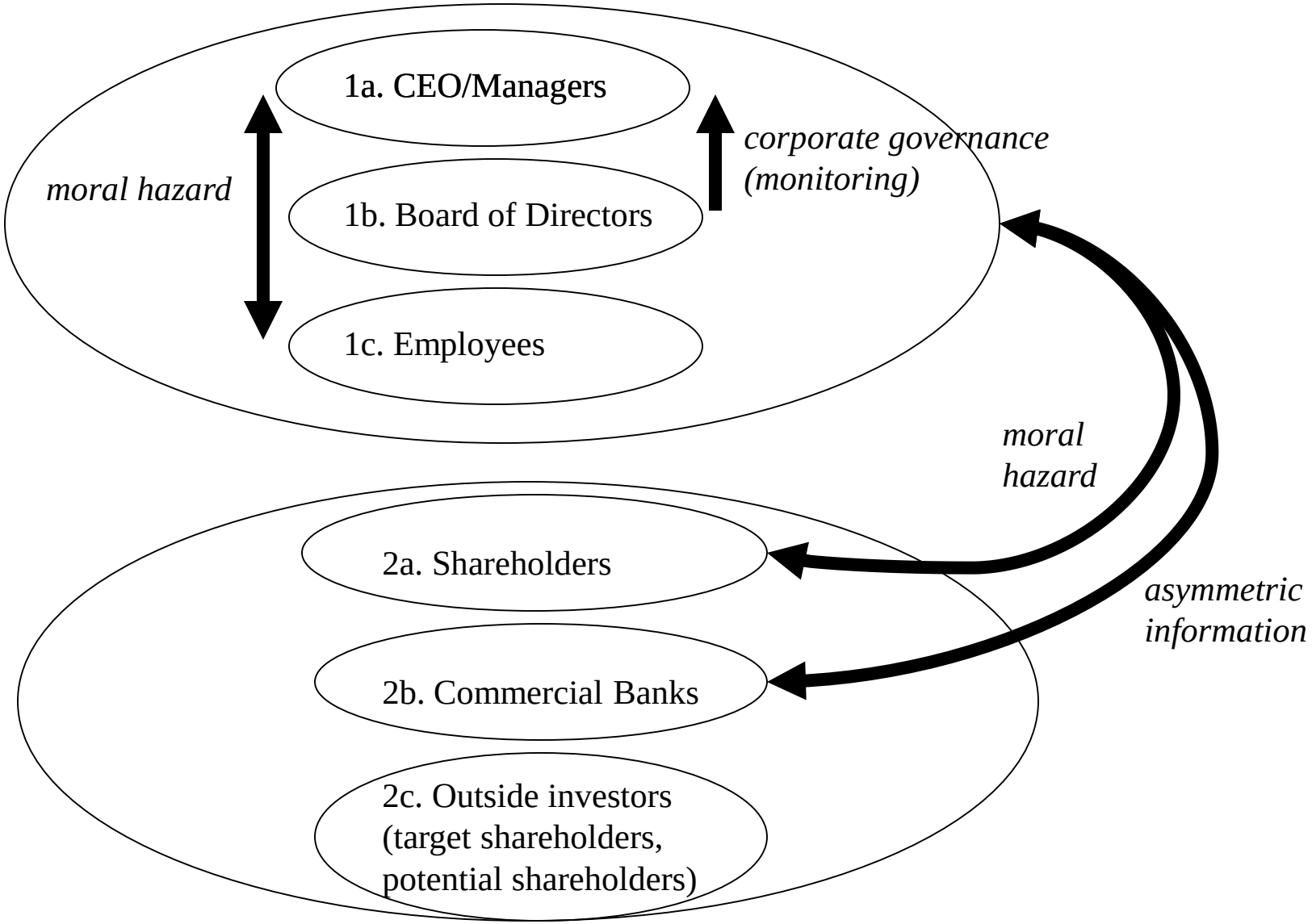
1. What is Behavioral CF?
   - What is CF?
2. Perspective 1: *Corporate Response* to Investor Biases
3. Perspective 2: Market Response to *Corporate Biases*

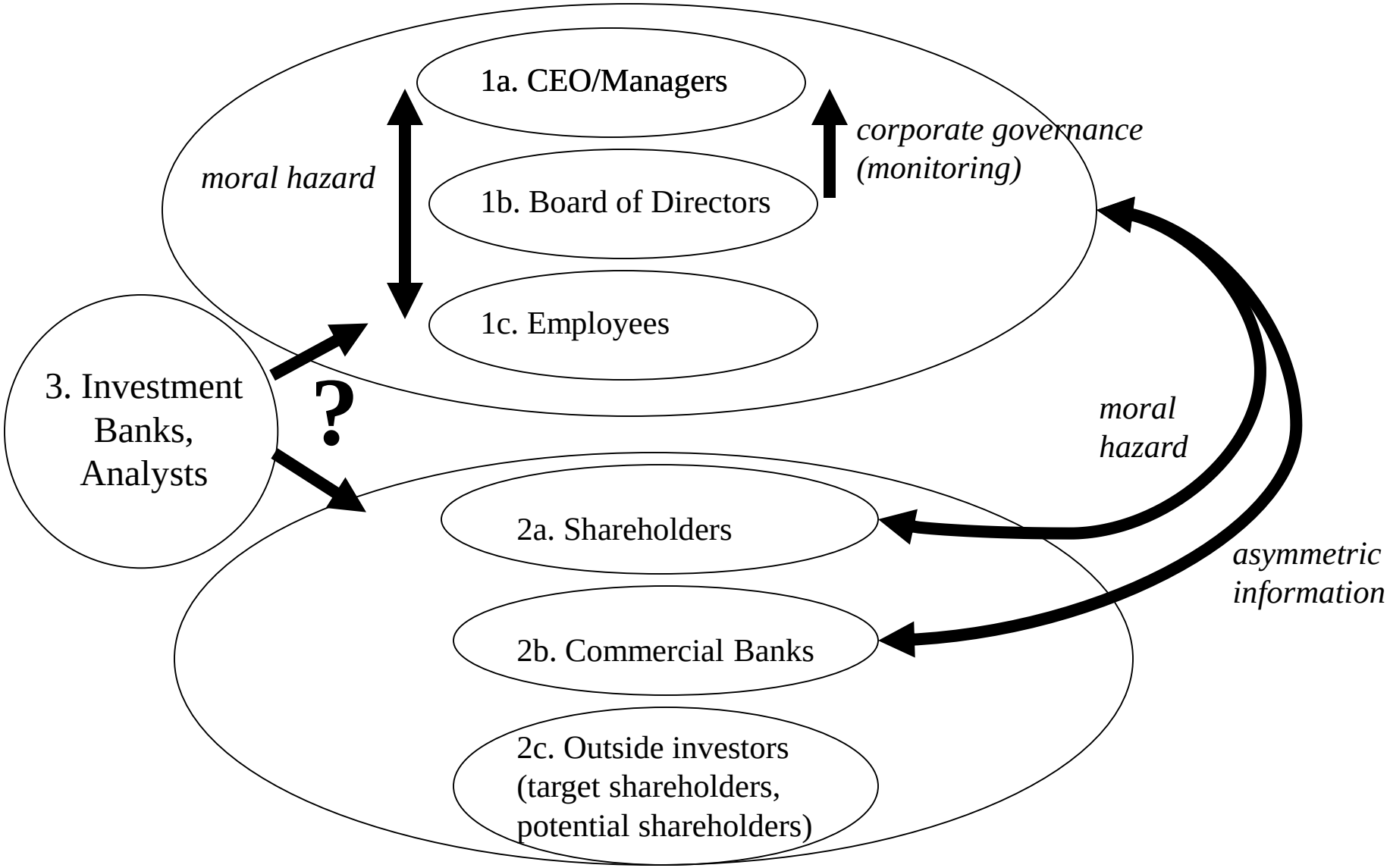
Corporate Finance … in a nutshell



Corporate Finance … zooming in



Corporate Finance … zooming in (II)



"What is CF?" in practice …

- Much broader than "corporate" (small firms, entrepreneurs, analysts, microfinance) and "finance" (any decision-making).
- Strong links to other empirical fields (PF, labor/organizational economics, devo), theory (contract theory/org econ)
  - Examples devo/political economy: microfinance, stock price reaction to bribes
  - Examples PF: dividends, taxes (agency, asymmetric info)
  - http://conference.nber.org/confer/ → Check out Spring / Fall / SI "CF" (and "BE") programs over the last couple of years
- So what is the separation from Applied Micro?
  - partly methodology (e.g. SE.s: Fama-McBeth vs. clustering); Petersen: kellogg.northwestern.edu/faculty/petersen/htm/papers/standarderror.html
  - partly data demands + advantages
  - partly job market requirements (AP, lingo, …) + advantages

Behavioral Corporate Finance

Systematic deviations from our standard model of rational decision-making.

Two perspectives:

Perspective 1: ***Investor biases***

→Non-standard investor behavior ("investor sentiment")

→Managerial response = Non-standard corporate finance policies (cf. "Behavioral IO")

Perspective 2: ***Managerial biases***

→Non-standard corporate finance policies

→Market response

Perspective 1: Biased Investors

- **Non-standard investor behavior:** Systematic deviations from rational/traditional-model individual investment decisions (investor sentiment), e.g. loss aversion, overconfidence, "experience effects" (on risk attitudes)
- **Managerial response**: Implications for corporate decisions which involve the market (equity issues, equity-financed mergers, equity-financed mergers).
    - Cf. "Behavioral IO"

Examples

- Investors sentiment → Timing of security issuances (*Baker and Wurgler, 2000; 2002*)
- Timing of mergers (*Shleifer and Vishny, 2003*)
- Employee sentiment → Stock-based compensation to lower-level employees (*Oyer, 2004; Bergman and Jenter, 2005*)

Perspective 1: Biased Investors

Advantage (promise in terms of research agenda):

- Plausibility ("smart managers, stupid investors")

Disadvantage (hurdles in research):

- Lack of homogeneity among investors … though see more careful papers distinguishing between stock with and without institutional ownership
- Unspecified "investor sentiment" … though see more recent research on anchoring effects in (Baker, Pan, Wurgler 2012)
- Lack of individual data to proxy for a bias rather than "fitting it to the data."
  - Cf. β-δ-models in "Paying Not to Go to the Gym" (AER 2006)
  - **Becomes an advantage if you get such data**

Perspective 2: Biased Managers

- **Managerial biase**s: Systematic deviations from rational/traditional-model corporate decisions, e.g. overconfidence, experiences, "traits"
- Inducing non-standard corporate policies, i.e., implications for
  - for investment decisions, financing decisions, resulting capital structure, mergers & acquisitions.
  - for role of the board / corporate governance (e.g. options vs debt overhang)
  - for internal labor market (role of tournaments, design of compensation contracts)
    - "Organizational Fixes" (Camerer and Malmendier (2007), Behavioral Economics of Organizations)
- **Market response**

Perspective 2: Biased Managers

Examples

- Overconfidence of CEOs → "Urge to merge" / to overinvest
  Malmendier and Tate, 2005, 2008, 2016 (JEP!)
- Experience bias of CEOs (economic depressions, military service, …) → Conservatism in investment, debt aversion
  Malmendier, Tate, and Yan, 2011; Schoar 2012; Benmelech and Frydman 2012

Perspective 2: Biased Managers

Advantages/Promise:

- "Homogeneity" of subgroups of CEOs
  - Forbes 500 companies, certain industries, entrepreneurs
  - Selection → Plausibility of certain biases and heuristics (that are beneficial to managers in many other situations)
- Data on individuals (ExecuComp, BoardEx, Who's Who, Million-Dollar-Directory)
  - Including information about incentives (compensation etc.)
- Central decision-makers → impact on important, far-reaching decisions (mergers, investment, hiring + down-sizing) … cf. "*what's the alpha*" in behavioral AP

Perspective 2: Biased Managers

Disadvantages:

- Selection (e.g., gender example in managerial traits)
- Low-frequency variation (e.g., within-firm turnover to identify manager specific effects)
- Novel data (?); cf. labor and the NLSY, other BLS data sets = ExecuComp

"Perspective 3": Other Players

E.g., analyst biases

- Systematic deviations from rational evaluation of companies, e.g. representativeness (stereotypes such as "losers" and "winners").
- Implications for corporate decisions such as earnings manipulation, budgeting to exceed thresholds.

E.g., rating agencies

E.g., regulators / law makers

E.g., central bankers (making of hawks and doves through their lifetime experiences) → funding

Application: M&A

Some stylized facts:

1. Huge economic significance (whether measured in dollar value of deals, dollar value of firms involved, shareholder value destroyed at announcement, job lost/created/changed, ..)
2. Mergers occur in waves.
3. Within a wave, mergers occur in industry clusters.
4. Merger financing
   * 1970s, 1980s: 45% (at least some) stock financing
   * 1990s: 70% (at least some) stock-financing
   * 2000s+ somewhat of a reversal
5. Negative effect on value for shareholders of acquiring company at announcement (on average or for a large portion), esp. in stock-financed mergers

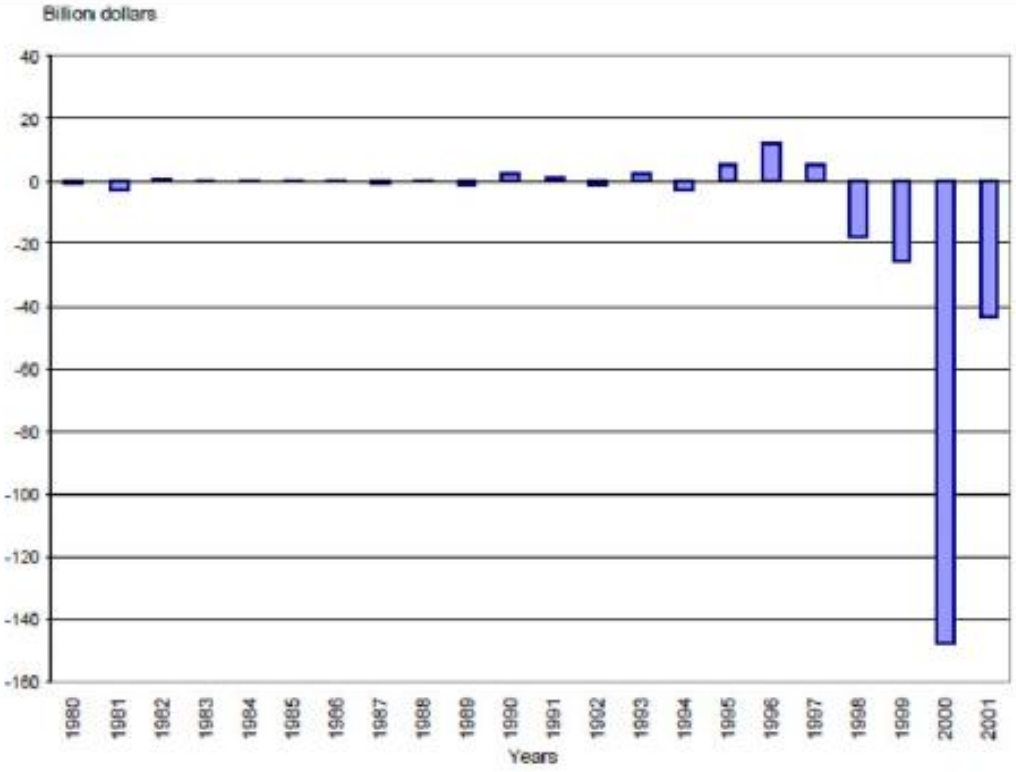


Figure 1. Yearly aggregate dollar return of acquiring-firm shareholders (1980 to 2001). Data are from the SDC Mergers and Acquisitions Database. The graph shows the aggregate dollar return associated with acquisition announcements for each sample year. The aggregate dollar return is defined as the sum of the product of the abnormal return of each announcement multiplied by the equity capitalization of the acquirer.

Moeller, Schlingemann, Stulz (2005): From 1991 to 2001 acquiring firms' shareholders lost $216bn in aggregate!
(more than 50x the $4bn lost 1980-1990)

Application: M&A

Perspective 1: Misvaluation of Investors

→"Investor sentiment"

→Managerial response: timing of mergers, in particular of stock-financed mergers

Perspective 2: Misvaluation of managers

→"CEO overconfidence"

→Market response: limited willingness to finance overestimated mergers (hence sensitivity to available internal funds); negative stock-price reaction to overestimated mergers

M&A – Perspective 1: Misvaluation of Investors

(Baker-Wurgler agenda; Shleifer-Vishny [2003] approach)

Acquirer *A* and Target *T* with

- Capital stock (unit) K_A and K_T
- "Short-run" current value $\boldsymbol{V_A = S_A K_A}$

$$\boldsymbol{V_T = S_T K_T}$$

$$\boldsymbol{V = S(K_T + K_A)}$$

w.l.o.g. $S_A > S_T$; typical case: $S_A > S > S_T$

⇒ Short-run gains (perceived synergies) from mergers:

$$\boldsymbol{V - V_A - V_T}$$

⇒ For example, zero perceived synergies if S such that

$$\boldsymbol{S(K_A + K_T) - S_A K_A - S_T K_T = 0}$$

M&A – Perspective 1: Misvaluation of Investors

- Long-run value $\tilde{V}_A = qK_A$
  $\tilde{V}_T = qK_T$
  $\tilde{V} = q(K_T + K_A)$

  $\Rightarrow$ Long-run gains from mergers: 0

- Managers act in own (=existing sh.holders') interest
- Managers exploit market irrationalities.
- Investors draws no inferences about the LR from merger announcements!

Cash-financed acquisition

- A pays cash PK_T ($\geq S_T K_T$)
  - E.g. $P = S_T \Longrightarrow$ No takeover premium.
  - E.g. $P = S \Longrightarrow$ Payment proportional to **SR** combined value.
- Short-run abnormal returns (**announcement effects**)
  - Acquirer:

$$\begin{aligned} & S(K_A + K_T) - PK_T - S_A K_A \\ = \; & (S - S_A)K_A + (S - P)K_T \end{aligned}$$

  - Target:

$$(P - S_T)K_T$$

$\Longrightarrow$ A-shareholders lose from perceived dilution ($S - S_A < 0$) or gain from "money machine" ($S - S_A > 0$)

$\Longrightarrow$ A-shareholders gain from high SR assessment of synergy relative to price ($S - P > 0$).

- Long-run abnormal returns:
  - Combined: $0 = q(K_A + K_T) - qK_A - qK_T$.
  - For A-Shareholders: $q(K_A + K_T) - PK_T - qK_A = (q - P)K_T$
  - For T-Shareholders: $(P - q)K_T$

$\Longrightarrow$ A-shareholders gain from high LR assessment of synergy relative to price ($q - P > 0$).

$\Longrightarrow$ T-shareholders gain from low LR assessment of synergy relative to price ($q - P < 0$).

(Zero-sum game.)

Stock-financed acquisition

- A pays cash fraction $x = \frac{PK_T}{S(K_A+K_T)}$.
  - Note implicit assumption to get to x.

- Short-run abnormal returns (**announcement effects**): as before

- Long-run abnormal returns
  - Combined Value: 0
  - For A-Shareholders:

$$\begin{aligned} & q(1-x)(K_A+K_T) - qK_A \\ = \; & q(1-\frac{PK_T}{S(K_A+K_T)})(K_A+K_T) - qK_A \\ = \; & q(K_A+K_T-\frac{PK_T}{S}) - qK_A = q(1-\frac{P}{S})K_T \end{aligned}$$

– For T-Shareholders: $q(\frac{P}{S} - 1)K_T$. (Has to be $-A$.)

$\Longrightarrow$ In the LR, A-shareholders gain from high valuation ($S - P > 0$).

$\Longrightarrow$ In the LR, T-shareholders gain from high valuation ($P - S > 0$).

Third important insight: Difference between LR value creation and LR (mean-reversion) returns.

- LR return of A without acquisition: $(q - S_A)K_A$.
  (Negative if A initially overpriced.)

- *Incremental* LR return of A from acquisition: $(1 - \frac{P}{S})qK_T$.
  (Positive if $P < S$.)

$\Longrightarrow$ In the LR, A-shareholders gain from high valuation ($S - P > 0$) even if overall LR return is negative.
("Not as negative as they would have been without the acquisition.")

Empirical issues:

How could you get a good benchmark for over/under valuation?

How could you separate the Tobin's Q effect from the over/under valuation effect?

How could you really get a good measure of the Long Run returns of the acquirers?

3 Misvaluation of Managers (Overconfidence)

Roll (JB 1986): The Hubris Hypothesis

- Let's step back from assuming a given acquirer A and a given target T. Instead: N potential acquirers of a given target T.

- Valuation process
  - Acquirers $A_1, A_2, ..., A_n, ..., A_N$ evaluate T
  - Current market values $V_{A_1}, V_{A_2}, ..., V_{A_N}, V_T$
  - Expected value of merger for A_n: $E_n[V_n] - V_{A_n}$

- How much should company A_n bid (at most)?
  - Vickrey (1961) for private values,
    Milgrom and Weber (1982) for common/affiliated values.
  - If expectation based on signal drawn from a common distribution:
    $b_n < E_n[V_n] - V_{A_n}$
    * E.g. in case of buy-out firm: $E_n[V_n] - V_{A_n} = E_n[V_T]$ and signals about future value of T drawn from common distribution.
    * Then $b_n < E_n[V_T]$.
  - Else: winner's curse.

- Hubris hypothesis (version 1): Bidders do not account for winner's curse and bid (up to) $E_n[V_T]$.

- Hubris hypothesis (version 2): Bidders account for winner's curse, shade their bid, but over-estimate the private-value element.

- Plausibility arguments:

  - We observe bids $b_n > V_T$ but not (rarely) $b_n < V_T$; thus we observe upwards bias but not downwards error.

  - Little opportunity to learn from past mistakes (few acquisitions over a managers lifetime, noisy outcome).

- Executives appear particularly prone to display overconfidence in experiments.

- Three main factors:

  * Being in control (incl. illusion of control)

  * High commitment to good outcomes

  * Reference point not concrete

(Weinstein, 1980; Alicke et al., 1995)

Missing piece:

$\longrightarrow$ Difference in opinion (between rational investors/market and overoptimistic managers) affects bidding behavior via financing constraints.

How?

$\longrightarrow$ **Heaton (FM 2002)**

$\longrightarrow$ **Malmendier and Tate (2008)**

3.1 Single Acquiror with Full Bargaining Power

- Market value of acquiror $A = V_A$; A-manager's valuation of $A = \widehat{V}_A$.
- Market value of target $T = V_T$.
- A has access to internal resources C (cash and other non-diluting assets); uses $c \leq C$ to pay target shareholders. If no merger takes place, c is 0 (and the full C is part of the firm value V_A).
- Target shareholders are paid with c and/or shares of the merged company.
- Market value of the combination of A and T after paying out $c = V(c)$; A-manager's valuation of the combination of A and $T = \widehat{V}(c)$.

- Overconfident A-manager
  - overvalues own company: $\widehat{V}_A > V_A$,
  - overvalues the merger, $\widehat{V}(c) - V(c) > \widehat{V}_A - V_A$ for some c.

- How much does CEO pay for T? How much in shares after cash payment c? How does it depend on overconfidence?
  Answer: Since the acquiring firm has all the bargaining power, it pays V_T for the target, independent of the CEO's overconfidence.
  For a given amount $c < V_T$ of cash financing, target shareholders demand a share s of the merged company such that $sV(c) = V_T - c$.

- When does a rational CEO conduct the takeover?
  Answer: iff $V(c) - (V_T - c) > V_A$.

- Denoting the merger synergies as $e \in R$, we can decompose $V(c)$ into

$$V(c) = V_A + V_T + e - c.$$

$\Longrightarrow$ Rational CEO makes the first best acquisition decision: acquires iff $e > 0$, *independently* of the available C.
$\Longrightarrow$ Since the capital market is fully efficient, there is no extra cost of raising external capital to finance the merger and the CEO is indifferent among cash, equity, or a combination.

- When does an overconfident CEO conduct the takeover?
Answer: Overestimates the returns to merging, but also believes that (partial) equity financing entails a loss to current shareholders of
$(\frac{V_T - c}{V(c)} - \frac{V_T - c}{\widehat{V}(c)})\widehat{V}(c) = \frac{V_T - c}{V(c)}(\widehat{V}(c) - V(c))$

- Denoting the "perceived" additional merger synergies as $\widehat{e} \in R_{++}$, we can decompose $\widehat{V}(c)$:

$$\widehat{V}(c) = \widehat{V}_A + V_T + e + \widehat{e} - c.$$

$\Longrightarrow$ Overconfident CEO acquires iff $e + \widehat{e} > \frac{V_T - c}{V(c)}(\widehat{V}(c) - V(c))$.

$\Longrightarrow$ That is, he merges whenever actual and perceived merger synergies exceed the perceived loss due to dilution.

$\Longrightarrow$ The higher c, the lower the perceived loss to dilutaion.

Empirical Approach

Most common approach to measuring CEO OC in behavioral finance literature (introduced in Malmendier and Tate, 2005; but better see JEP 2015):

Use decisions that the executive makes on his or her **personal portfolio** of company stock options. (Typical 10-year duration, typically vested after 4 yrs.) → Link to **corporate decision.** *Note: successful approach for borrowing*, *leverage*, ..

Empirical Approach

Background: Since the 1980s (particularly in the 1990s), top US executives have received increasingly large stock and option grants as part of their compensation (Hall and Murphy 2003).

➔ under-diversified w.r.t. company-specific risk.

➔ CEOs have a limited ability to address this issue (e.g., restricted stock [time-based vesting or performance-based vesting]; stock options not tradeable and typically also take years to vest; executives are contractually prohibited from taking short positions in the company's stock.

Empirical Approach

Logic:

Rational, risk-averse executive should seek to exercise stock options (once vested) in order to diversify.

- Exact timing of optimal option exercise depends on "moneyness" of the options, risk aversion, and extent of under-diversification (Lambert, Larcker, and Verrechia 1991; Hall and Murphy 2002).

OC executives overestimate the future performance of their firms ➔ More willing to hold options, expecting to profit from expected stock price appreciation.

➔ Systematic tendency to hold options longer before exercise as a measure of overconfidence.

Measure: CEO holds options all the way to expiration (at least 40% in the money) have taken a long-term bet on the future performance of their company's stock, despite their under-diversification.

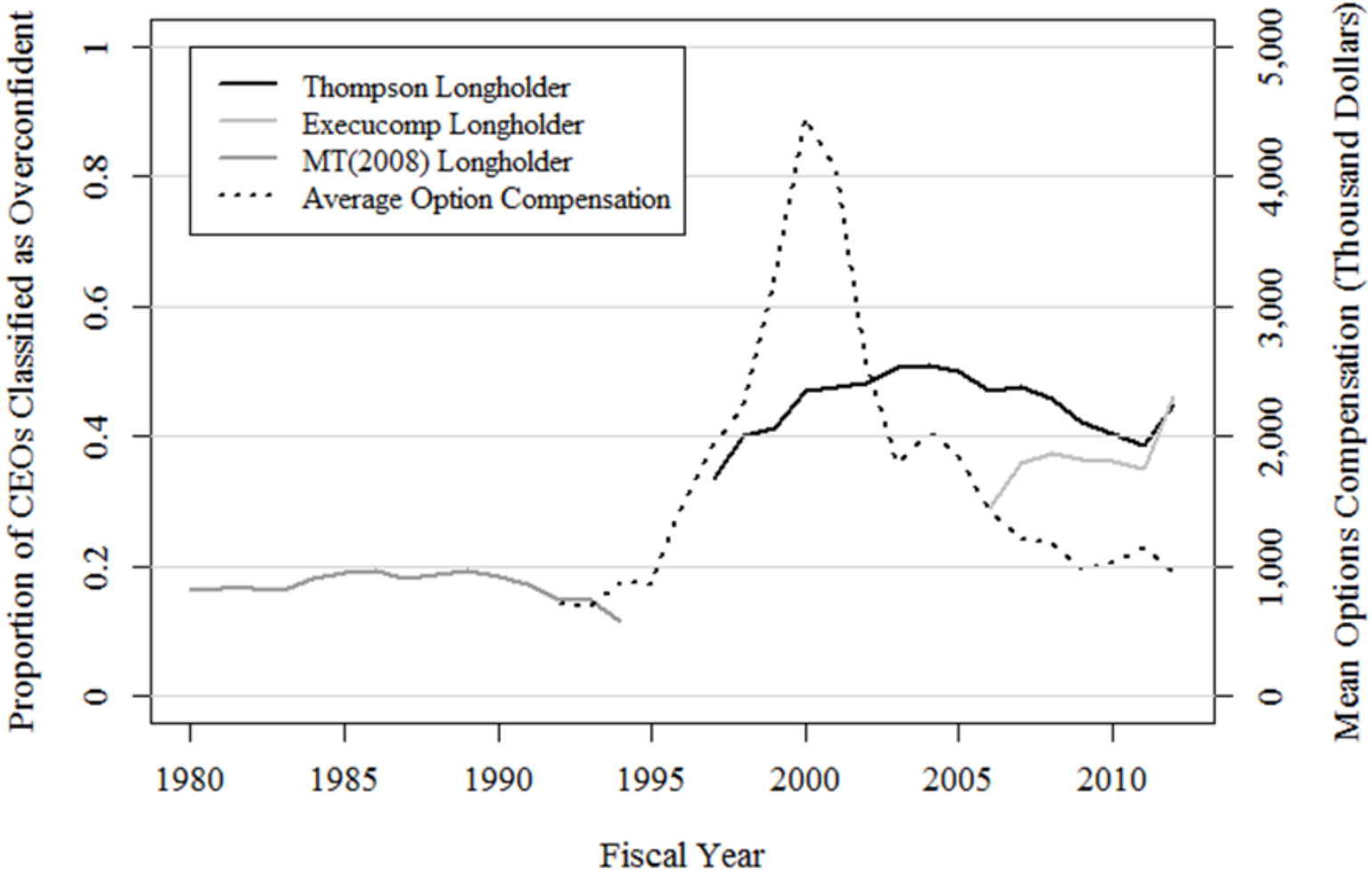
Data

Original "Longholder" measure constructed from Hall and Liebman (1998) data (CEO stock and option holdings in Forbes 500 companies from 1980 to 1994).

Updated Longholder

1. Thomson Reuters' Insider Filings database for the 1996-2012 time period
2. Compustat's Execucomp database in the format available after 2006

Figure 1: Option-Based Overconfidence Measure



Note. Distribution of option receivers also drastically changed (younger, smaller firms). Or: Experience of long up market.

Empirical Specification

$$\Pr\{Y_{it} = 1 \mid X, O_{it}\} = G(\beta_1 + \beta_2 \bullet O_{it} + X^T\boldsymbol{\gamma})$$

with
- i company
- t year
- Y acquisition (yes or no)
- O overconfidence
- X controls

→ H_0: $\beta_2 = 0$ (overconfidence does not matter)
→ H_1: $\beta_2 > 0$ (overconfidence does matter)

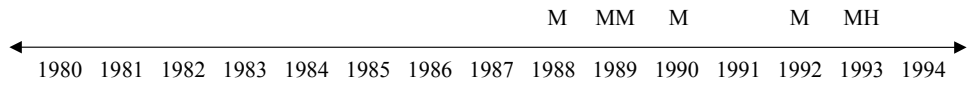
Table 4. Do Overconfident CEOs Complete More Mergers?

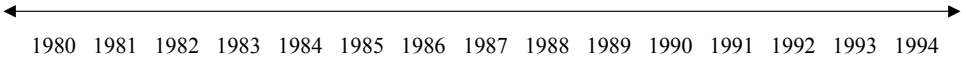
Longholder = holds options until last year before expiration (at least once)
Distribution: Logistic. Constant included.
Dependent Variable: Acquistion (yes or no)**; Normalization:** Capital.

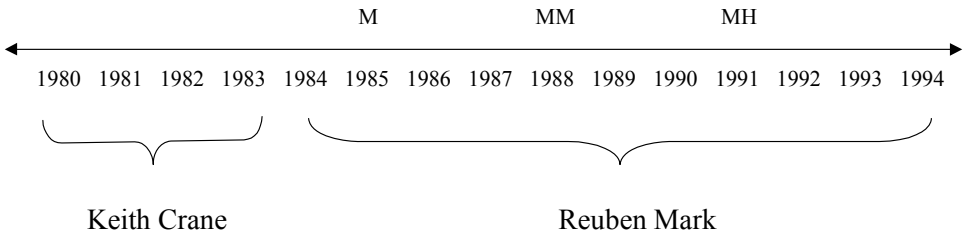
	logit with controls	random effects logit	logit with fixed effects
Size	**0.8733**	**0.8600**	**0.6234**
	(1.95)*	(2.05)**	(2.60)***
Q_{t-1}	**0.7296**	**0.7316**	**0.8291**
	(2.97)***	(2.70)***	(1.11)
Cash Flow	**2.0534**	**2.1816**	**2.6724**
	(3.93)***	(3.68)***	(2.70)***
Ownership	**1.2905**	**1.3482**	**0.8208**
	(0.30)	(0.28)	(0.11)
Vested Options	**1.5059**	**0.9217**	**0.2802**
	(1.96)*	(0.19)	(2.36)**
Governance	**0.6556**	**0.7192**	**1.0428**
	(3.08)***	(2.17)**	(0.21)
Longholder	**1.5557**	**1.7006**	**2.5303**
	(2.58)***	(3.09)***	(2.67)***
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	2261
Firms		327	184

Identification Strategy

	Logit & Random Effects Logit	Fixed Effects Logit
Case 1:		
Wayne Huizenga (Cook Data Services/Blockbuster) • CEO for all 14 years of sample • Longholder	Yes	No
J Willard Marriott (Marriott International) • CEO for all 15 years of sample • Not a Longholder		
Case 2:		
Colgate Palmolive • Keith Crane CEO from 1980-1983 (Not a Longholder) • Reuben Mark CEO from 1984-1994 (Longholder)	Yes	Yes







Alternative Explanations

1. Inside Information or Signaling
   - Mergers should “cluster” in final years of option term
   - Market should react favorably on merger announcement.
   - CEOs should “win” by holding

Table 5. Timing of Overconfidence Effect

Sample: All firm years
Dependent Variable: Acquistion (yes or no)

	logit with random effects	logit with random effects	logit with random effects
3 Final Years of a Longheld Option	**1.5399**		
	(1.86)*		
4 Final Years of a Longheld Option		**1.6626**	
		(2.41)**	
5 Final Years of a Longheld Option			**1.7072**
			(2.68)***
Remaining Longholder CEO Years	**1.8045**	**1.7371**	**1.6916**
	(3.04)***	(2.68)***	(2.39)***
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	3690
Number of Firms	327	327	327

Regressions include Size, Q_{t-1}, Cash Flow, Ownership, Vested Options, and Governance.

Table 6. Are Overconfident CEOs Right to Hold Their Options? (I)

Returns from exercising 1 year sooner and investing in the S&P 500 index	
Percentile	Return
10th	-0.24
20th	-0.15
30th	-0.10
40th	-0.05
50th	-0.03
60th	0.03
70th	0.10
80th	0.19
90th	0.39
Mean	0.03
Standard Deviation	0.27
All exercises occur at the maximum stock price during the fiscal year	

Table 6. Are Overconfident CEOs Right to Hold Their Options? (II)

Do "Mistaken" Holders Drive the Acquisitiveness Result?

Longholder = holds options until last year before expiration (at least once)

Distribution: Logistic. Constant included.

Dependent Variable: Acquistion (yes or no) **; Normalization:** Capital.

	logit	random effects logit	fixed effects logit
Size	**0.8721**	**0.8598**	**0.6251**
	(1.93)**	(1.99)**	(2.46)***
Q_{t-1}	**0.7259**	**0.7347**	**0.8806**
	(2.86)**	(2.54)**	(0.74)
Cash Flow	**2.0042**	**2.1030**	**2.8787**
	(3.49)**	(3.22)***	(2.64)***
Stock Ownership	**1.5555**	**1.5853**	**0.7498**
	(0.51)	(0.42)	(0.15)
Vested Options	**2.8574**	**1.7361**	**0.4921**
	(1.36)	(0.53)	(0.51)
Corporate Governance	**0.6220**	**0.6823**	**1.0343**
	(3.31)***	(2.45)**	(0.16)
Longholder: Did OK	**1.2015**	**1.2082**	**1.1555**
	(0.74)	(0.80)	(0.27)
Longholder: Should Have Exercised	**1.8277**	**1.9591**	**4.4648**
	(1.95)*	(2.32)**	(2.32)**
Year Fixed Effects	yes	yes	yes
Observations	3532	3532	2111
Firms		318	172

Alternative Explanations

1. Inside Information or Signalling
   - Mergers should "cluster" in final years of option term
   - Market should react favorably on merger announcement
   - CEOs should "win" by holding

2. Stock Price Bubbles
   - Year effects already removed
   - All cross-sectional firm variation already removed
   - Lagged stock returns should explain merger activity

Table 7. Control for Returns

Longholder = holds options until last year before expiration (at least once)

Returns = ln(1+returns)

Distribution: Logistic. Constant included.

Dependent Variable: Acquistion (yes or no) **; Normalization:** Capital.

	logit	logit with random effects	logit with fixed effects
$Returns_{t-1}$	**1.4801**	**1.4467**	**1.1424**
	(1.61)	(1.62)	(0.54)
$Returns_{t-2}$	**1.2539**	**1.2391**	**1.0474**
	(1.15)	(1.01)	(0.20)
$Returns_{t-3}$	**1.0635**	**1.0405**	**0.9262**
	(0.31)	(0.19)	(0.35)
$Returns_{t-4}$	**1.3548**	**1.3452**	**1.2513**
	(1.40)	(1.37)	(0.98)
$Returns_{t-5}$	**1.2334**	**1.2202**	**1.1539**
	(1.03)	(0.95)	(0.66)
Longholder	**1.5048**	**1.6184**	**2.4628**
	(2.33)**	(2.83)***	(2.56)**
Year Fixed Effects	yes	yes	yes
Observations	3479	3479	2157
Firms		305	173

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.

Alternative Explanations

1. Inside Information or Signalling
   - Mergers should "cluster" in final years of option term
   - Market should react favorably on merger announcement
   - CEOs should "win" by holding

2. Stock Price Bubbles
   - Year effects already removed
   - All cross-sectional firm variation already removed
   - Lagged stock returns should explain merger activity

3. Volatile Equity

4. Finance Training

Return Volatility

Longholder = holds options until last year before expiration (at least once)

Volatility = ln(1+variance(ln(1+returns)))

Distribution: Logistic. Constant included.

Dependent Variable: Acquistion (yes or no)**; Normalization:** Capital.

	logit	logit with random effects	logit with fixed effects
$Volatility_{t-1}$	**1.2672**	**1.2413**	**1.0403**
	(3.22)***	(2.42)**	(0.34)
Longholder	**1.4784**	**1.6777**	**2.6370**
	(2.26)**	(3.02)***	(2.69)***
Year Fixed Effects	yes	yes	yes
Observations	3432	3432	2102
Firms	319	319	180

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.

Finance Education

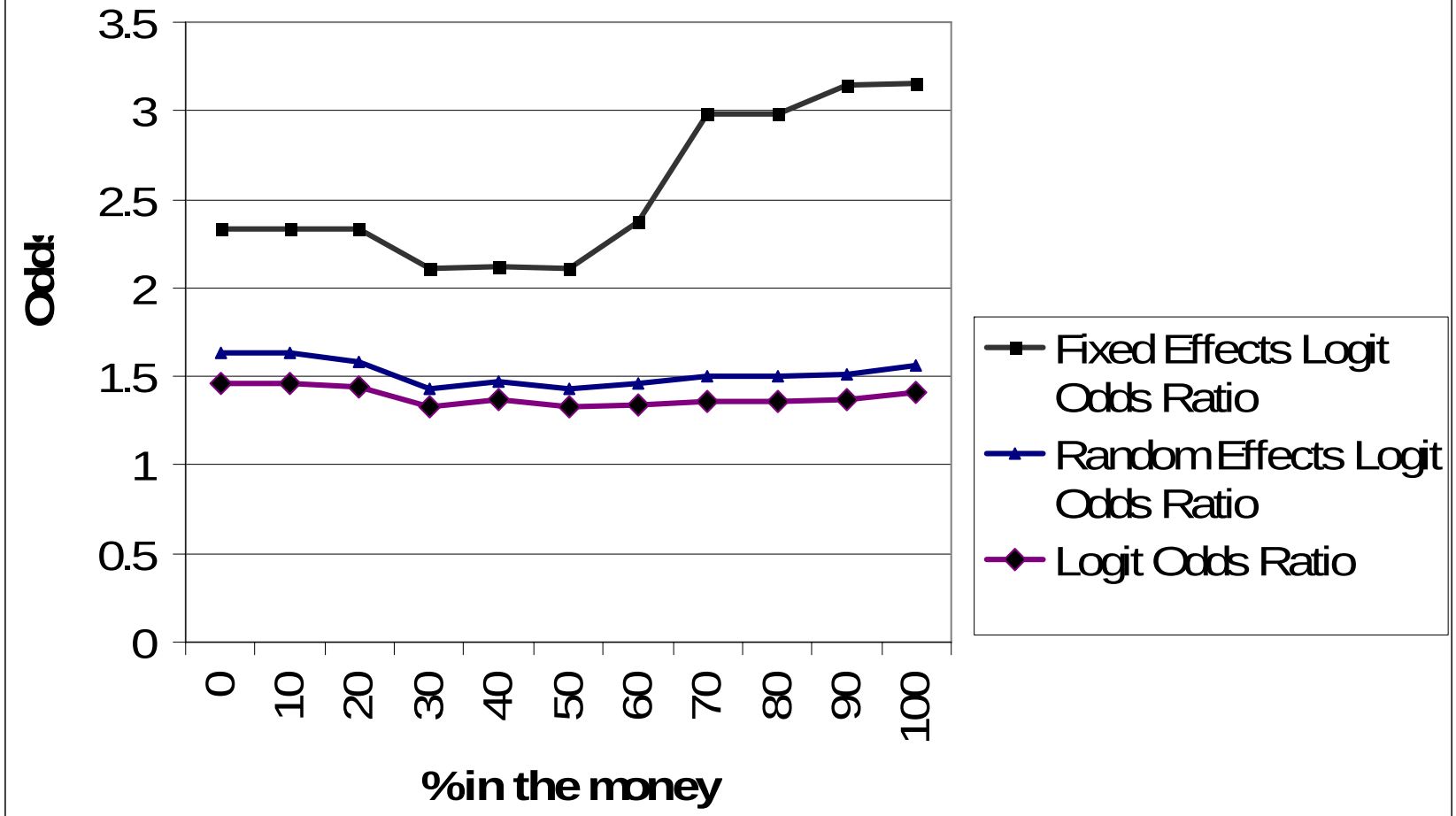
Longholder = holds options until last year before expiration (at least once)
Distribution: Logistic. Constant included.
Dependent Variable: Acquistion (yes or no)**; Normalization:** Capital.

	logit with controls	random effects logit	fixed effects logit
Size	**0.7624**	**0.7536**	**0.1998**
	(2.27)**	(2.49)**	(3.96)***
Q_{t-1}	**0.8624**	**0.8514**	**0.6985**
	(1.24)	(1.01)	(1.32)
Cash Flow	**1.0686**	**1.0389**	**0.9442**
	(0.24)	(0.14)	(0.13)
Ownership	**1.0163**	**0.8967**	**18.3462**
	(0.01)	(0.06)	(0.31)
Vested Options	**1.2847**	**1.3302**	**3.7916**
	(0.28)	(0.22)	(0.73)
Governance	**0.5132**	**0.5515**	**1.2581**
	(3.01)***	(2.51)**	(0.72)
Finance Education	**1.5500**	**1.6434**	**3.2946**
	(2.00)**	(2.17)**	(1.46)
Longholder	**1.7248**	**1.8757**	**5.6952**
	(2.29)**	(2.42)**	(1.51)
Year Fixed Effects	no	no	yes
Observations	1489	1489	819
Firms	188	188	83

Robustness

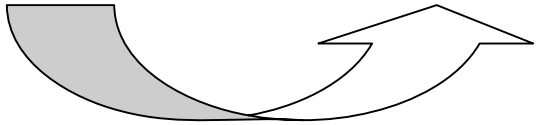
- Do the results hold as we vary the percentage in the money required for a holder to be overconfident? Yes.

Figure 1. Odds Ratios for different % in the money



Empirical Predictions

Rational CEO	Overconfident CEO



1. On average?
2. Overconfident CEOs do more mergers that are likely to destroy value
3. Overconfident CEOs do more mergers when they have abundant internal resources
4. The announcement effect after overconfident CEOs make bids is lower than for rational CEOs

Diversifying Mergers

1. Diversification discount
   (Lamont and Polk 2002; Servaes 1996; Berger and Ofek 1995; Lang and Stulz 1994)

2. Market understands ex ante
   (Morck, Shleifer, and Vishny 1990)

Table 8. Diversifying Mergers

Longholder = holds options until last year before expiration (at least once)
Distribution: Logistic. Constant included; **Normalization:** Capital.
Dependent Variable: Diversifying merger (yes or no).

	logit	logit with random effects	logit with fixed effects
Longholder	**1.6008**	**1.7763**	**3.1494**
	(2.40)**	(2.70)***	(2.59)***
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	1577
Firms		327	128

Dependent Variable: Intra-industry merger (yes or no).

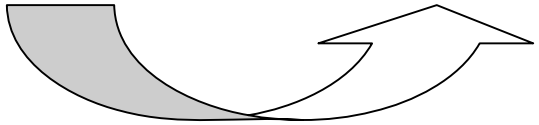
Longholder	**1.3762**	**1.4498**	**1.5067**
	(1.36)	(1.47)	(0.75)
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	1227
Firms		327	100

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.
Industries are Fama French industry groups.

Empirical Predictions

Rational CEO

Overconfident CEO



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Kaplan-Zingales Index

$$KZ = -1.00 \cdot \frac{CashFlow}{Capital} + 0.28 \cdot Q + 3.14 \cdot Leverage - 39.37 \cdot \frac{Dividends}{Capital} - 1.31 \cdot \frac{Cash}{Capital}$$

- Coefficients from logit regression (Pr{financially constrained})
- High values ⟶ Cash constrained
  - Leverage captures debt capacity
  - Deflated cash flow, cash, dividends capture cash on hand
  - Q captures market value of equity (Exclude?)

Table 9. Kaplan-Zingales Quintiles

Longholder = holds options until last year before expiration (at least once)
Distribution: Logistic. Constant included.
Dependent Variable: Acquistion (yes or no)**; Normalization:** Capital.
All regressions are logit with random effects.

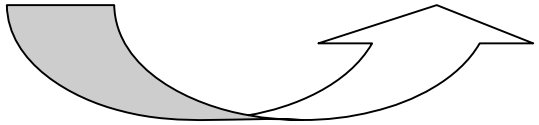
	Least Equity Dependent		---------->		Most Equity Dependent
			All Mergers		
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Longholder	**2.2861**	**1.6792**	**1.7756**	**1.9533**	**0.8858**
	(2.46)**	(1.48)	(1.54)	(1.50)	(0.33)
Year Fixed Effects	yes	yes	yes	yes	yes
Observations	718	719	719	719	718
Firms	125	156	168	165	152
			Diversifying Mergers		
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Longholder	**2.5462**	**1.8852**	**1.7297**	**1.0075**	**1.0865**
	(1.89)*	(1.51)	(1.36)	(0.01)	(0.18)
Year Fixed Effects	yes	yes	yes	yes	yes
Observations	718	719	719	719	718
Firms	125	156	168	165	152

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.

Empirical Predictions

Rational CEO

Overconfident CEO



1. On average?
2. Overconfident CEOs do more mergers that are likely to destroy value
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Empirical Specification

$$CAR_i = \beta_1 + \beta_2 \bullet O_i + X'\gamma + \varepsilon_i$$

with i company

O overconfidence

X controls

$$CAR_i = \sum_{t=-1}^{1} (r_{it} - E[r_{it}])$$

where $E[r_{it}]$ is daily S&P 500 returns (α=0; β=1)

Table 14. Market Response

Longholder = holds options until last year before expiration (at least once)
Dependent Variable: Cumulative abnormal returns [-1,+1]

	OLS (3)	OLS (4)	OLS (5)
Relatedness	**0.0048**	**0.0062**	**0.0043**
	(1.37)	(1.24)	(1.24)
Corporate Governance	**0.0079**	**0.0036**	**0.0073**
	(2.18)**	(0.64)	(1.98)**
Cash Financing	**0.014**	**0.0127**	**0.0145**
	(3.91)***	(2.60)***	(3.99)***
Age			**-0.0005**
			(1.46)
Boss			**0.0001**
			(0.04)
Longholder	**-0.0067**	**-0.0099**	**-0.0079**
	(1.81)*	(2.33)**	(2.00)**
Year Fixed Effects	yes	yes	yes
Industry Fixed Effects	no	yes	no
Industry*Year Fixed Effects	no	yes	no
Observations	687	687	687
R-squared	0.10	0.58	0.10

Regressions include Ownership and Vested Options.

Do Outsiders Recognize CEO Overconfidence?

Portrayal in Business Press:

1. Articles in
   - New York Times
   - Business Week
   - Financial Times
   - The Economist
   - Wall Street Journal
2. Articles published 1980-1994
3. Articles which characterize CEO as
   - Confident or optimistic
   - Not confident or not optimistic
   - Reliable, conservative, cautious, practical, steady or frugal

Measuring Press Portrayal

TOTALconfident =

1	if ["confident" + "optimistic"] > ["not confident" + "not optimistic + "reliable, conservative, cautious, practical, steady, frugal]
0	otherwise

Independent of the effects of coverage frequency

Market Perception versus CEO beliefs

- TOTALconfident positively and statistically significantly correlated with Longholder
  - Farrell and Mark are TOTALconfident
  - Marriott and Crane are *not* TOTALconfident
- TOTALconfident CEOs (like Longholders) are more acquisitive on average
  - Especially through diversifying mergers
  - Especially when they are financially unconstrained

Overconfidence – identified by CEO *or* market beliefs – leads to heightened acquisitiveness

Table 13. Press Coverage and Diversifying Mergers

Distribution: Logistic. Constant included; **Normalization:** Capital. **Dependent Variable:** Diversifying merger (yes or no).	logit	logit with random effects	logit with fixed effects
TOTALconfident	**1.6971**	**1.7826**	**1.5077**
	(2.95)***	(3.21)***	(1.48)
Year Fixed Effects	yes	yes	yes
Observations	3647	3647	1559
Firms		326	128
Dependent Variable: Intra-industry merger (yes or no).			
TOTALconfident	**1.0424**	**1.0368**	**0.8856**
	(0.20)	(0.16)	(0.31)
Year Fixed Effects	yes	yes	yes
Observations	3647	3647	1226
Firms		326	100
Regressions include Total Coverage, Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance. Industries are Fama French industry groups.			

Conclusions

- Overconfident managers are more acquisitive.
- Much of this acquisitiveness is in the form of diversifying mergers.
- Overconfidence has largest impact if CEO has abundant internal resources.
- The market reacts more negatively to the mergers of overconfident CEOs

Implications for Contract Design

Overconfidence vs. “empire-building” preferences:

- Immune to incentives
- Responds to capital structure (motivates “debt overhang”)
- Requires board independence and vigilance

Empirical Approach in the 21st century

- **Identification of biases**, not just average behavior.
- Big unresolved question: Selection!
  - Cf. gender.
- Big danger: *p*-hunting for “traits and biases”

Empirical Approach in the 21st century

- **Identification corporate decision**, e.g. I/CF sensitivity (Malmendier and Tate 2005): I on OC, CF, OC*CF, FE among *financially constraint* firms

→ exploit a natural-experiment design: plausibly exogenous exposure to external financing costs (Almeida, Campello, Laranjeira, and Weisbenner, 2012)

  - Prior to Aug 2007: stable/decreasing spreads on both investment-grade and high-yield bonds
  - Aug 2007: decline in housing prices in 2006 + wave of subprime mortgage → early 2008: spreads on investment-grade corporate bonds risen from 1 pp to 3 pp; spreads on high-yield corporate bonds risen from 3 pp to 7-8 pp.

(Only changes before Great Recession, before the Lehman bankruptcy, before other economic catastrophes in September 2008.)

→ Identify the effect of a shock to financing constraints on corporate investment exploiting differences across firms in the portion of long-term debt that matured just after the shock hit.

Questions

Biased Managers or Biased Investors?

Who is biased? Which approach is right?

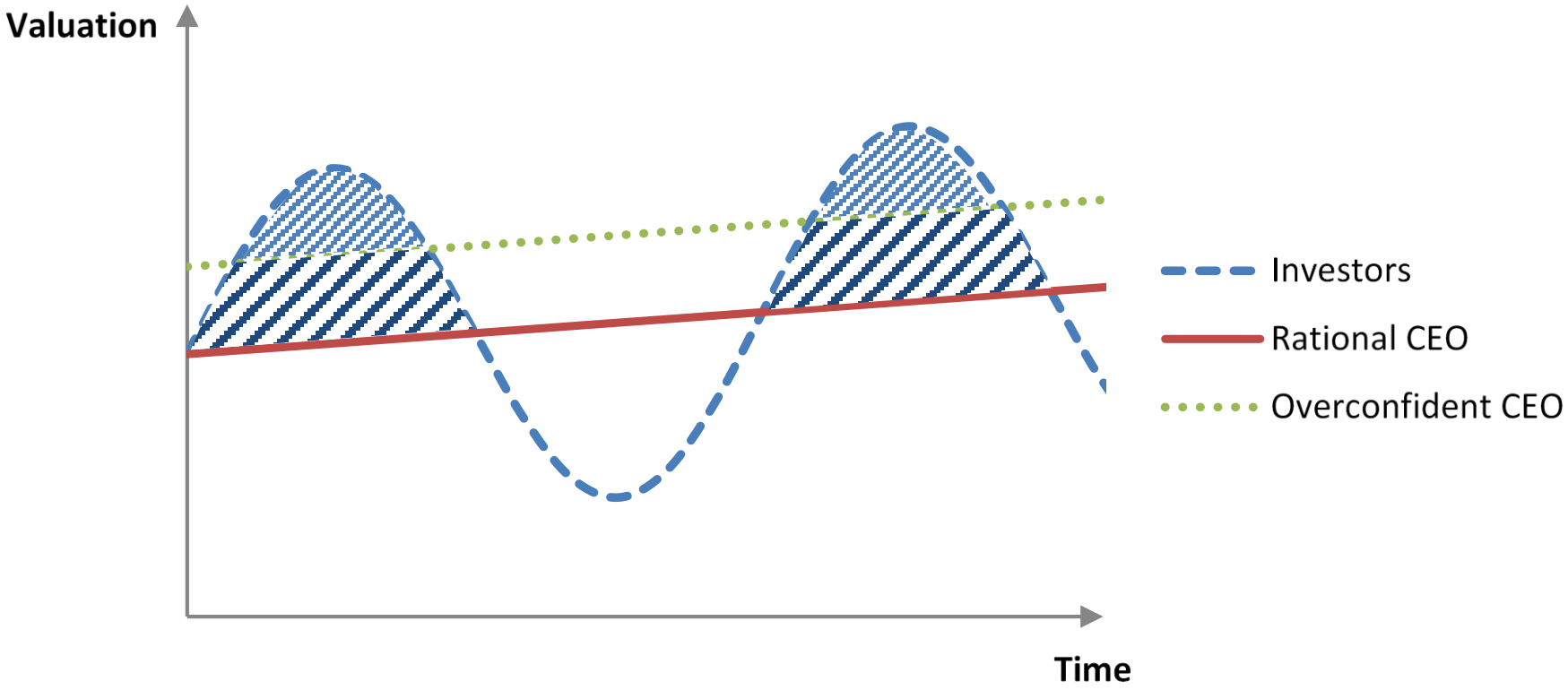
Not the right question

Consider gym example –self-control problems of members and overconfidence of entrepreneurs;

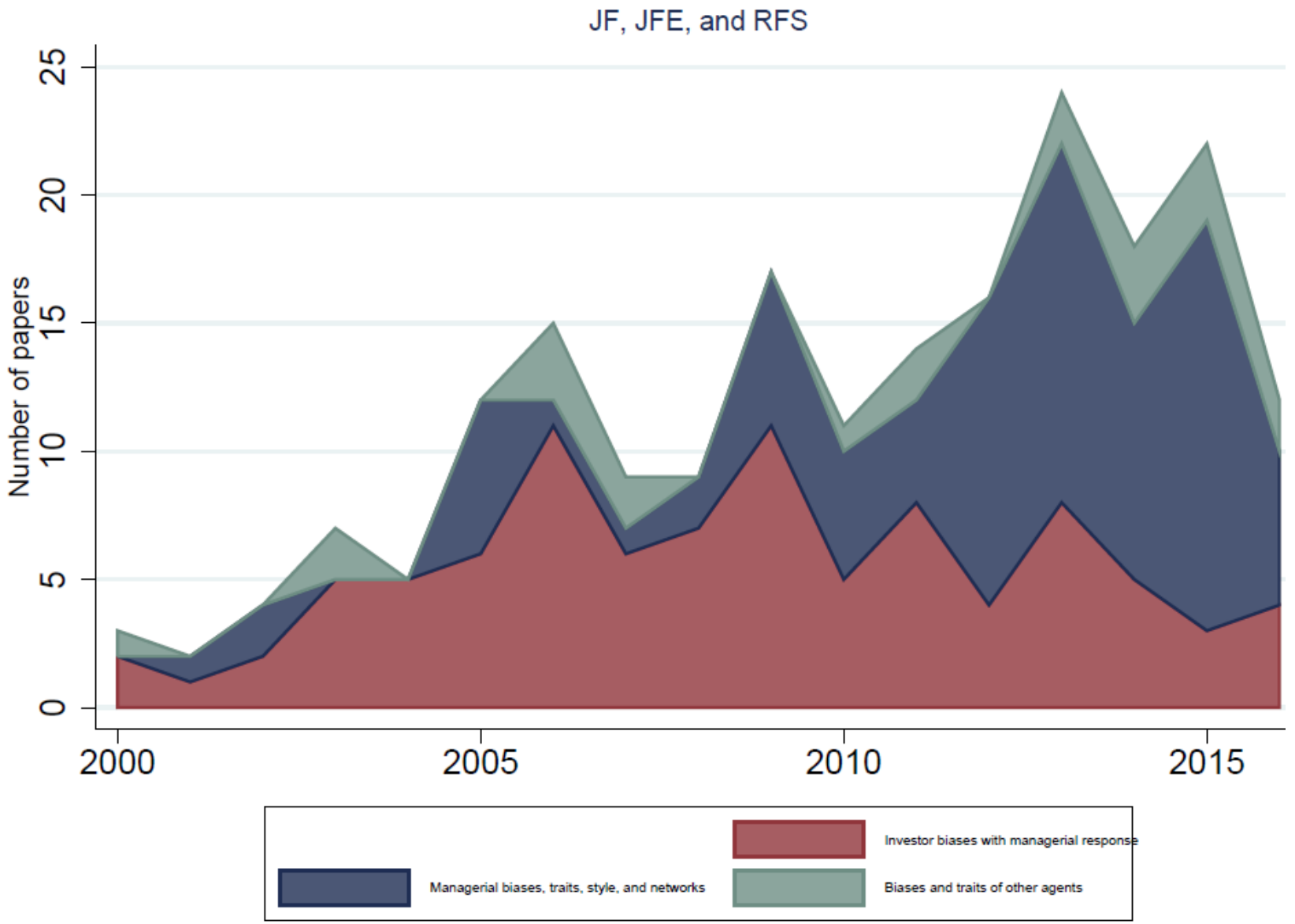
Merger example: easily consistent. (**Graph!**)

Figure 2.

Illustration of Differences in Firm Valuation



Where is the field going?



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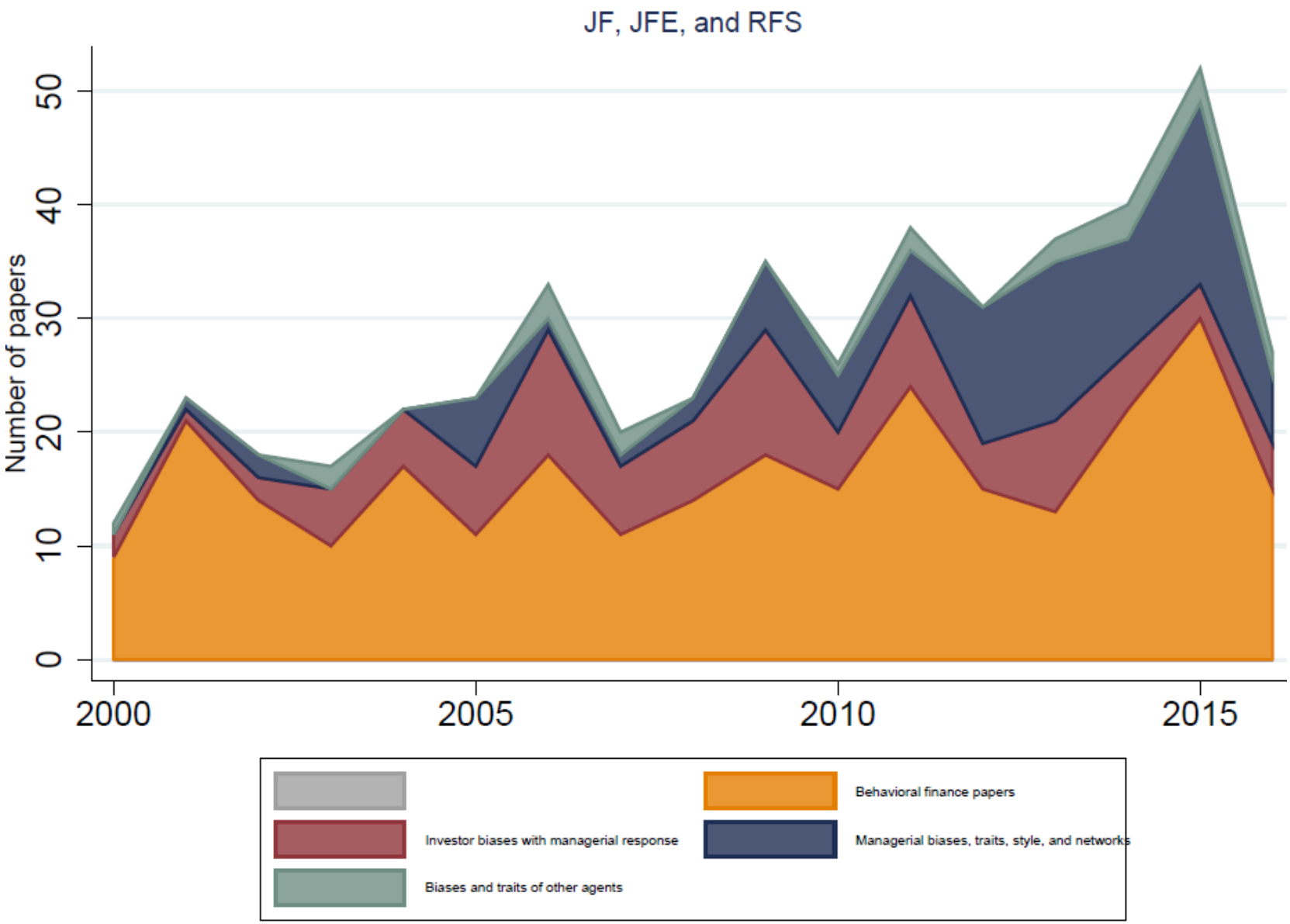

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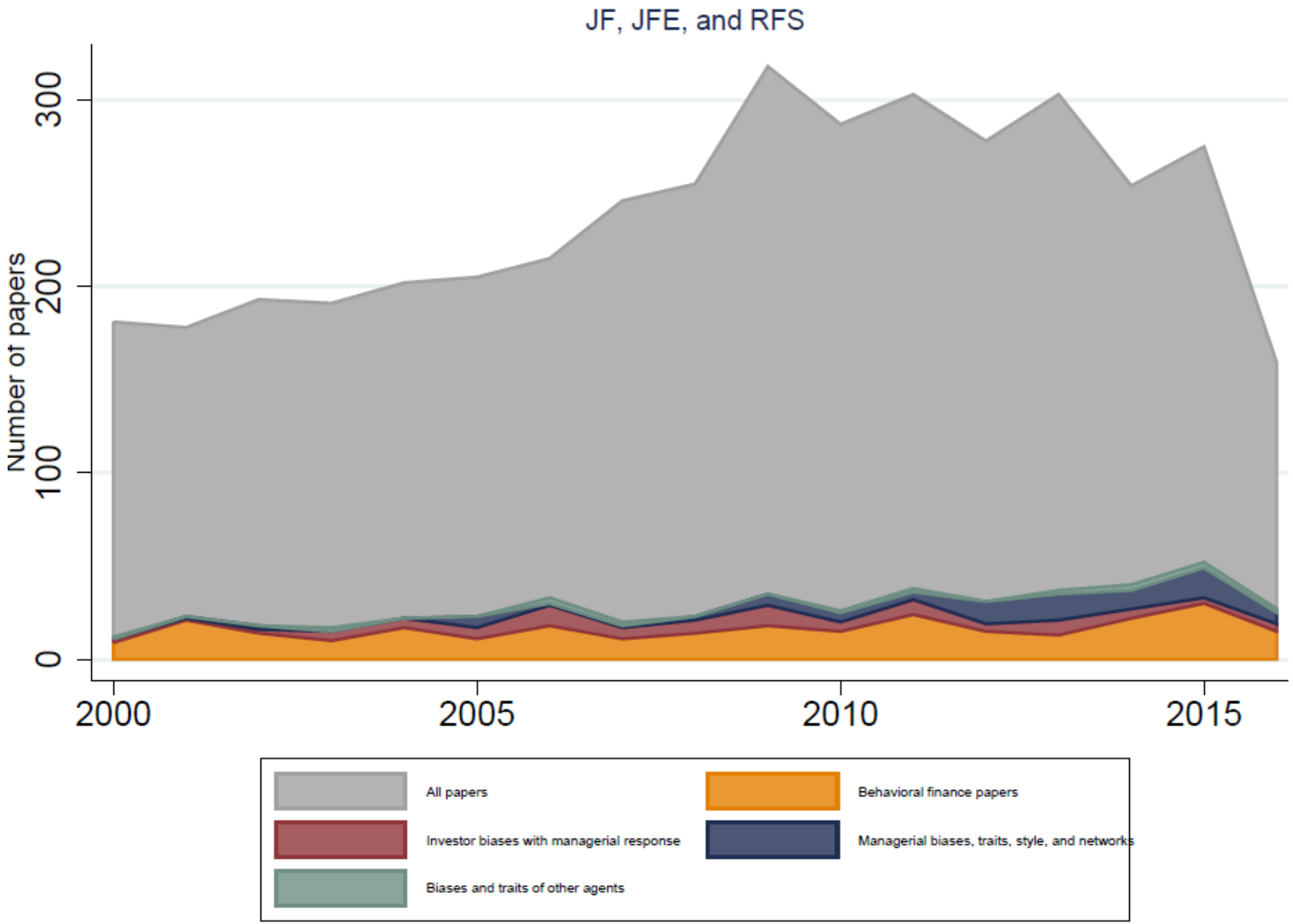

Questions

Question: What about interactions of these biases? What if biases of managers and of investors are correlated?

→ Generates exacerbated booms and busts in many settings. Can we get more distinctive predictions?

Example

- CEO overconfidence appears to be pro-cyclical.
  - Measure: under-diversified CEOs invest even more in their company (do not exercise options that are highly in the money, buy additional stock)
  - Number of CEOs who are “identifiable” as overconfident increase in good times.
  - But also: Percentage of overconfident CEOs increases in good times.
- Investor sentiment appears to be pro-cyclical (investors more optimistic in good times, pessimistic in bad times)

Open Questions

Empirically important biases. Prior: sunk-cost fallacy (escalation of commitment), lifetime experiences, hindsight bias

Microdata of decision-making processes and people involved in the firm (corporation as well as start-up)

- Stories, status quo, persuasion, confirmation , …
- Prior experiences (engineers versus MBAs)